



FACULTY OF APPLIED SCIENCES
DOCTOR OF PHILOSOPHY IN ARTIFICIAL INTELLIGENCE DRIVEN DRUG
DISCOVERY
LEARNING MODULE OUTLINE

Academic Year	2024/2025	Semester	1
Module Code	AIDD8121		
Learning Module	Research Methodology & Ethics		
Pre-requisite(s)	Nil		
Medium of Instruction	Chinese and English		
Credits	3	Contact Hours	45 hrs
Instructor	Duo Wang Jingjing Guo	Email	duo.wang@mpu.edu.mo jguo@mpu.edu.mo
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MODULE DESCRIPTION

The purpose of this module is to teach students the principles and practical aspects of research methodology and ethics. Students will learn the importance of ethical consideration in research, how to use LaTeX for professional document preparation, computational methods for data analysis, and how to better understand computational codes. Additionally, they will learn how to conduct a literature review and write research proposals and papers. By the end of the module, students will have a comprehensive understanding of the research process and be able to conduct ethical and high-quality research.

MODULE INTENDED LEARNING OUTCOMES (ILOS)

On completion of this learning module, students will be able to:

M1.	Demonstrate a comprehensive understanding of research methodology and ethics principles.
M2.	Utilize LaTeX effectively for the preparation of professional documents, including research proposals, papers, and reports.
M3.	Understand and work with computational source code to enhance their research capabilities.
M4.	Gain experience in critically evaluating and reviewing research articles in the field of AI drug discovery, and enhance academic skills in individual or team presentation
M5.	Identify the distinct research activities required over the research project cycle, and conduct good quality research in AI-driven drug discovery.

These ILOs aims to enable students to attain the following Programme Intended Learning Outcomes (PILOs):

PILOs	M1	M2	M3	M4	M5
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P1. To demonstrate understanding in scientific methodologies and techniques of AI in drug discovery	✓			✓	
P2. To demonstrate of knowledge and in-depth understanding of a wide range of AI drug discovery related topics				✓	✓
P3. To demonstrate knowledge and hands-on experience of analysis, assessment and solutions of the AI drug discovery related issues		✓		✓	
P4. To understand and work with computational source code to enhance their research capabilities.			✓		
P5. To initiate original researches in <i>in-silico</i> drug discovery, both individually and collaboratively in a team				✓	✓
P6. To plan, design, execute and manage a scholarly research project		✓		✓	✓
P7. To critically assess and analyse an advanced technical issue	✓				✓
P8. To communicate research findings, both orally to diverse audiences and in writing through publishing research papers of scholarly values.				✓	✓
P9. To gather and disseminate knowledge at the postgraduate level and beyond	✓	✓	✓		✓
P10. To demonstrate professional ethics & integrity, and the spirit of challenge	✓			✓	✓

MODULE SCHEDULE, COVERAGE AND STUDY LOAD

Week	Content Coverage	Contact Hours
1	1. Ethics I	3
2	2. Ethics II	3
3	3. Introduction to LaTeX	3
4	4. Introduction to Computational Methods I	3
5	5. Introduction to Computational Methods II	3
6	6. Introduction to Computational Methods III	3
7	7. Introduction to Computational Methods IV	3
8	8. Fundamental Research Methodology	3
9	9. Literature Review	3
10	10. Writing Research Proposals and Papers I	3
11	11. Writing Research Proposals and Papers II	3
12	12. Individual Student Presentation I	3
13	13. Individual Student Presentation II	3
14	14. Individual student presentation III	3



15	15. Individual student presentation IV	3
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TEACHING AND LEARNING ACTIVITIES

In this learning module, students will work towards attaining the ILOs through the following teaching and learning activities:

Teaching and Learning Activities	M1	M2	M3	M4	M5
T1. Lectures	✓	✓	✓	✓	✓
T2. Hands-on practices		✓	✓		
T3. Assignments				✓	✓

ATTENDANCE

Attendance requirements are governed by the “Academic Regulations Governing PhD Degree Programmes of Macao Polytechnic University”. Students who do not meet the attendance requirements for the module will not be permitted to sit the final or re-sit examination and shall be awarded an ‘F’ grade.

ASSESSMENT

In this learning module, students are required to complete the following assessment activities:

Assessment Activities	Weighting (%)	ILOs to be Assessed
A1. Quiz (Ethics related)	10%	M1
A2. Assignment (Literature survey)	35%	M2,M4
A3. Course Work	20%	M3
A4. Presentation (Project Proposal/Others)	35%	M5

This learning module is graded on a 100 point scale, with 100 being the highest possible score and 50 being the passing score.

The assessment will be conducted following the University’s Assessment Strategy (see www.mpu.edu.mo/teaching_learning/en/assessment_strategy.php). Passing this learning module indicates that students will have attained the ILOs of this learning module and thus acquired its credits.

REQUIRED READINGS

As specified during the module: scientific literature and journal articles.

REFERENCES

Reference book(s)

1. Paula Boddington (2017). *Towards a Code of Ethics for Artificial Intelligence*, Springer.
2. Sam Salek, Andrew Edgar (2002). *Pharmaceutical Ethics*. John Wiley & Sons, Ltd.



3. Deb D., Dey R., Balas V. E. (2019) *Engineering Research Methodology - A Practical Insight for Researchers*, Springer Nature Singapore.
4. O’Leary Z. (2017) *The Essential Guide to Doing Your Research Project*, 3rd Ed., SAGE Publications Ltd.
5. Stuart Russell and Peter Norvig (2021). *Artificial Intelligence: A Modern Approach*, 4th Ed., Prentice Hall
6. Nathan Brown (2021). *Artificial Intelligence in Drug Discovery*, Royal Society of Chemistry.
7. Alexander Heifetz (2022). *Artificial Intelligence in Drug Design*, Humana Press.
8. Steven E. Koonin and Dawn C. Meredith (1990). *Computational Physics*, Westview Press.
9. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, Joseph Bizup, and William T. Fitzgerald (2016), *The Craft of Research*, 4th Ed., University of Chicago Press.

Website (s)

10. The European Code of Conduct for Research Integrity,
http://www.esf.org/fileadmin/Public_documents/Publications/Code_Conduct_ResearchIntegrity.pdf

STUDENT FEEDBACK

At the end of every semester, students are invited to provide feedback on the learning module and the teaching arrangement through questionnaires. Your feedback is valuable for instructors to enhance the module and its delivery for future students. The instructor and programme coordinators will consider all feedback and respond with actions formally in the annual programme review.

ACADEMIC INTEGRITY

The Macao Polytechnic University requires students to have full commitment to academic integrity when engaging in research and academic activities. Violations of academic integrity, which include but are not limited to plagiarism, collusion, fabrication or falsification, repeated use of assignments and cheating in examinations, are considered as serious academic offenses and may lead to disciplinary actions. Students should read the relevant regulations and guidelines in the Student Handbook which is distributed upon the admission into the University, a copy of which can also be found at www.mpu.edu.mo/student_handbook/.